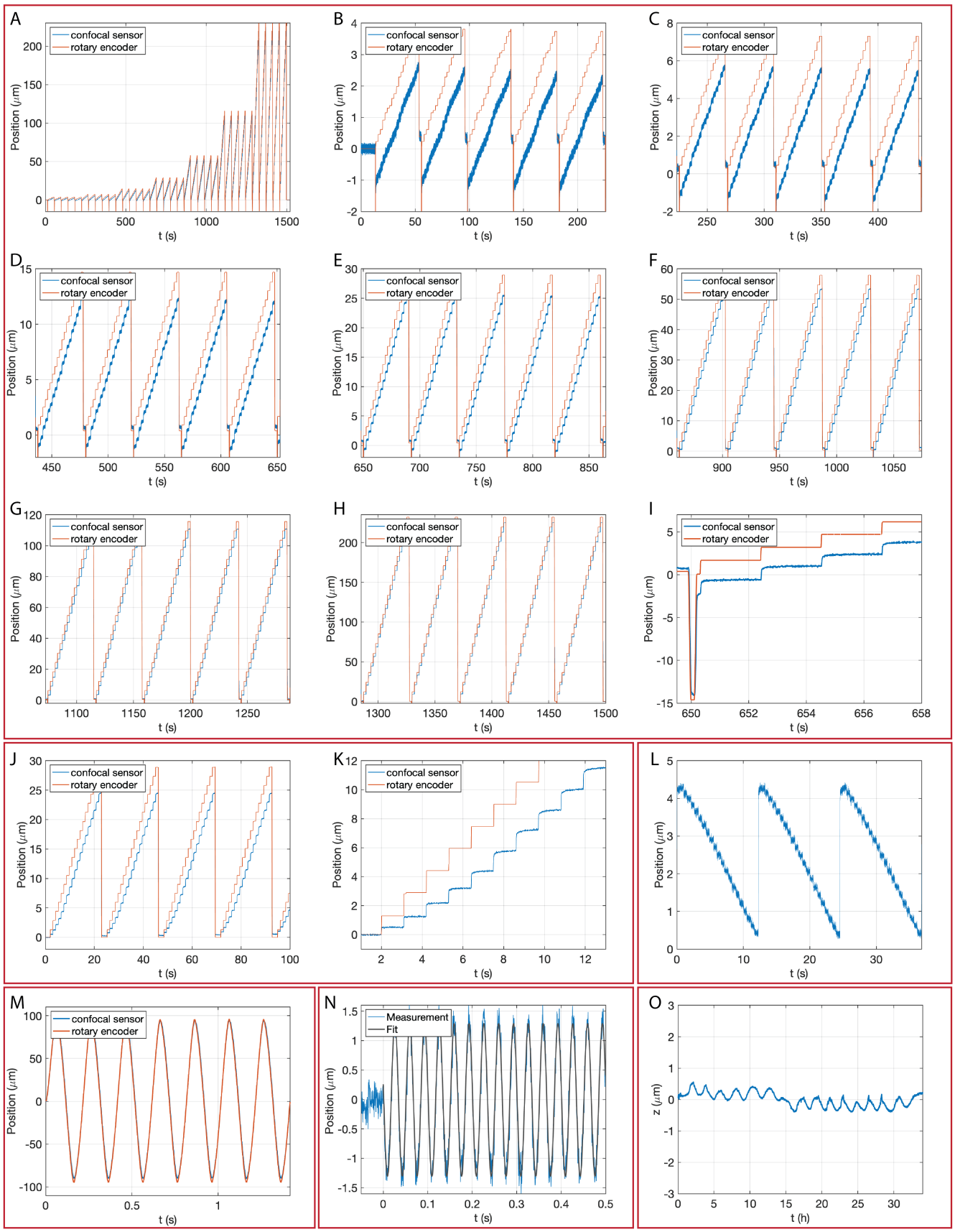

Supplementary Figure 1. Focus stage characterization with a chromatic confocal sensor. (A) 20-step z-scan with step size of 1, 2, 4, 8, 16, 32, 64 microsteps (with 8-microstepping), corresponding to nominal step size of 188 nm, 376 nm, 752 nm, 1.5 μm, 3 μm, 6 μm, 12 μm. (B-H) Zoomed-in view of (A). (I) Zoomed-in view of the "back-and-forth" maneuver (80 microsteps) to reduce the effect of mechanical backlash. (J-K) When the "back-and-forth" maneuver is not performed, unidirectional repeatability is worse and the first few steps are smaller. (L) The step size is relatively uniform when the stage is actuated by the piezo stack, suggesting that the mechanical backlash is in the linear actuator rather than the ball bearing stage. (M) Scanning with the linear actuator at 5 Hz with peak-to-peak amplitude of 180μm (N) Scanning with the piezo stack at 30 Hz with peak-to-peak amplitude of 2.5μm (O) Z-drift measurement over 30 hours.